



Crystal River Nuclear Plant  
Docket No. 50-302  
Operating License No. DPR-72

Ref: 10 CFR 50.54(f)

September 17, 2003  
3F0903-02

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
11555 Rockville Pike  
Rockville, Maryland 20852

**Subject:** Crystal River Unit 3 – 30-Day Response to Bulletin 2003-02, Leakage from Reactor Pressure Vessel Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity

**Reference:** Bulletin 2003-02: Leakage from Reactor Pressure Vessel Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity

Dear Sir:

Pursuant to 10 CFR 50.54(f), Progress Energy Florida, Inc. (PEF), is hereby submitting the 30-day response to the Referenced NRC Bulletin for Crystal River Unit 3 (CR3).

Attachment A to this letter provides the information requested in Items 1, 1(a), 1(b), 1(c) and 1(d) of the Bulletin. The report requested in Item 2 will be submitted, as requested, within 60 days after plant restart following the next inspection.

PEF concludes in Attachment A that CR3 satisfies the applicable regulatory requirements related to the integrity of the Reactor Pressure Vessel Lower Head Penetrations.

Although not required by CR3 procedures, this Bulletin response has been reviewed by the Plant Nuclear Safety Committee.

If you have any questions regarding this submittal, please contact Mr. Sid Powell, Supervisor, Licensing and Regulatory Programs at (352) 563-4883.

Sincerely,

Dale E. Young  
Vice President  
Crystal River Nuclear Plant

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**Attachments:**

- A. Response to Items 1, 1(a), 1(b), 1(c) and 1(d) of NRC Bulletin 2003-02: Leakage from Reactor Pressure Vessel Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity**
- B. List of Regulatory Commitments**

**xc: NRR Project Manager  
Regional Administrator, Region II  
Senior Resident Inspector**

STATE OF FLORIDA

COUNTY OF CITRUS

Dale E. Young states that he is the Vice President, Crystal River Nuclear Plant for Progress Energy Florida, Inc.; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission the information attached hereto; and that all such statements made and matters set forth therein are true and correct to the best of his knowledge, information, and belief.

*Dale E. Young*

Dale E. Young  
Vice President  
Crystal River Nuclear Plant

The foregoing document was acknowledged before me this 17th day of September, 2003, by Dale E. Young.

*Janet Schroeder*

Signature of Notary Public  
State of Florida



(Print, type, or stamp Commissioned  
Name of Notary Public)

Personally Known ☒ -OR- Produced Identification ☐

**PROGRESS ENERGY FLORIDA, INC.**

**CRYSTAL RIVER UNIT 3**

**DOCKET NUMBER 50 - 302 / LICENSE NUMBER DPR - 72**

**ATTACHMENT A**

**Response to Items 1, 1(a), 1(b), 1(c) and 1(d) of NRC Bulletin 2003-02:  
Leakage from Reactor Pressure Vessel Lower Head Penetrations and Reactor  
Coolant Pressure Boundary Integrity**

## Introduction

On August 21, 2003, the Nuclear Regulatory Commission (NRC) issued Bulletin 2003-02, "Leakage from Reactor Pressure Vessel Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity." The NRC requested that specific information be provided as follows:

### *NRC Request*

1. *All subject PWR addressees are requested to provide the following information. The responses for facilities that will enter refueling outages before December 31, 2003, should be provided within 30 days of the date of this bulletin. All other responses should be provided within 90 days of the date of this bulletin.*

### Response

Crystal River Unit 3 (CR3) will enter Refueling Outage 13 in October 2003. Thus, Progress Energy Florida, Inc. hereby responds to the 30-day information request set forth in the Bulletin.

### *NRC Request*

- 1(a) *A description of the RPV (Reactor Pressure Vessel) lower head penetration inspection program that has been implemented at your plant. The description should include when the inspections were performed, the extent of the inspections with respect to the areas and penetrations inspected, inspection methods used, the process used to resolve the source of findings of any boric acid deposits, the quality of the documentation of the inspections (e.g., written report, video record, photographs), and the basis for concluding that your plant satisfies applicable regulatory requirements related to the integrity of the RPV lower head penetrations.*

### Response

As identified in the CR3 response to Questions 5 and 9 (Reference 1) of the NRC request for additional information on boric acid inspection programs (Reference 2), previous inspections of the Incore Monitoring Instrumentation (IMI) penetrations at CR3 have been performed as part of the ASME Section XI system leakage test walkdown performed at every (24 month) refueling outage (RFO) with the system at normal operating pressure and the insulation in place. The last inspection was performed during RFO 12, fall 2001. These walkdown inspections are performed by procedure (SP-204) and documented on a system pressure test report in accordance with the CR3 ASME Section XI Program. The system pressure tests have not identified any IMI leakage to date. As stated in Reference 1, CR3 has concluded that the Boric Acid Inspection Program satisfies the applicable regulatory requirements.

***NRC Request***

***1(b) A description of the RPV lower head penetration inspection program that will be implemented at your plant during the next and subsequent refueling outages. The description should include the extent of the inspections which will be conducted with respect to the areas and penetrations to be inspected, inspection methods to be used, qualification standards for the inspection methods, the process used to resolve the source of findings of boric acid deposits or corrosion, the inspection documentation to be generated, and the basis for concluding that your plant will satisfy applicable regulatory requirements related to the structural and leakage integrity of the RPV lower head penetrations.***

**Response**

**Extent of the inspections during the next refueling outage**

The planned examination scope for CR3 RFO 13 (October 2003) will include all 52 IMI penetrations including 100% of the circumference of each penetration as it enters the Reactor Vessel lower head. The insulation will be removed, as needed, to provide access to the bare metal around each IMI penetration. This bare metal examination is a first of a kind examination in a high dose area. CR3 has a mock-up of the bottom head which was used for previous Inservice Inspection (ISI) exams and which has been re-assembled to aid in the planning of this inspection. In addition to these preparations, CR3 has procured camera equipment with extendable and articulating heads to assist in obtaining the required coverage.

**Subsequent inspections**

CR3 will schedule and perform the enhanced visual examinations of each IMI penetration described above to coincide with the 10 year ISI examinations of the RPV. The next 10 year ISI RPV exam is currently scheduled for RFO 15 (2007). CR3 will monitor Operating Experience (OE) and industry experiences to adjust this schedule appropriately. In addition to these enhanced exams of the IMIs, CR3 will continue to perform the current ASME required Class 1 leak check of the IMIs every RFO.

**Inspection methods to be used**

The examination method for the IMIs at CR3 will be direct visual (VT-2) aided by the use of remote camera equipment.

**Qualification standards for the inspection methods**

The visual examination personnel and procedures will be qualified in accordance with the Progress Energy's written practice, ASME Section XI, and supplemented by the March 2002 EPRI report (Reference 6), as applicable, for the lower head penetrations.

### **Process used to resolve the source of findings**

CR3 will utilize the Boric Acid Corrosion Control Program and the Corrective Action Program, as applicable, to evaluate all findings of leakage during the IMI penetration examination. The process will include evaluations to determine if the findings of leakage are relevant, non-relevant, as well as the source of the leakage. Examples of relevant leakage are identified in the March 2002 EPRI report (Reference 6) supplemented by the as found pictures of the boric acid accumulation at South Texas Project Unit 1 (STP-1) at IMI locations #1 and #46 which are available on the NRC web site. Those examples reveal characteristics of relevant indications. Unlike the reactor vessel head upper penetrations, the bottom head location has no potential leak source location during normal plant operation that could result in boron accumulation. Cavity seal ring leakage that occurs during a refueling outage only occurs at low temperature and results in staining without the "popcorn like" accumulation features of an RCS leak at normal operating temperature. The lower head location of the IMI penetrations is also not likely to be affected by settled debris that could mask the VT-2 examination. Tools to evaluate relevant indications of leakage (boron accumulation) would likely include sample collection for chemical and isotopic analysis.

Examples of non-relevant leakage may include thin films or stains of boron or light surface rust having a characteristic of no discernable thickness with no accumulation around the penetration. Non-relevant indications would typically have a trail leading to the source which is away from the IMI penetration. Each case of leakage will be documented. This documentation will include the results of the determination (if the finding is relevant or non-relevant to leakage) from an IMI nozzle. Thin film boron stains or light surface rust films are not likely to be chemically or isotopically analyzed due to there not being any accumulation for a sample.

### **Inspection Documentation**

The examinations will be documented by a report signed by the qualified VT-2 examiner that performed the examination. Video and photographic images to support the examination findings will supplement the report.

### **Basis for concluding that your plant will satisfy applicable regulatory requirements**

The technical basis for concluding that the regulatory bases are met for CR3 is provided in the Regulatory Requirements Section of MRP-48 (Reference 4) that was provided for the upper head reactor vessel head Alloy 600 penetrations (NRC Bulletin 2001-01), and as supplemented by the CR3 plant specific discussion of regulations provided in the CR3 response to NRC Bulletin 2001-01 and in References 1 and 3. The only difference from the upper head penetrations and the lower head IMI penetrations is that the clearance fit design of the IMI penetrations make a leak more likely to be detected at the early stages.

***NRC Request***

- 1(c) If you are unable to perform a bare-metal visual inspection of each penetration during the next refueling outage because of the inability to perform the necessary planning, engineering, procurement of materials, and implementation, are you planning to perform bare-metal visual inspections during subsequent refueling outages? If so, provide a description of the actions that are planned to enable a bare-metal visual inspection of each penetration during subsequent refueling outages. Also, provide a description of any penetration inspections you plan to perform during the next refueling outage. The description should address the applicable items in paragraph (b).***

**Response**

As stated in the response to 1(b) above, CR3 is planning to complete bare metal examination of all 52 IMI penetrations for RFO 13 (October 2003).

***NRC Request***

- 1(d) If you do not plan to perform either a bare-metal visual inspection or non-visual (e.g., volumetric or surface) examination of the RPV lower head penetrations at the next or subsequent refueling outages, provide the basis for concluding that the inspections performed will assure applicable regulatory requirements are and will continue to be met.***

**Response**

CR3 is planning to complete bare metal visual inspections as described above.

***NRC Request***

- 2. Within 60 days of plant restart following the next inspection of the RPV lower head penetrations, the subject PWR addressees should submit to the NRC a summary of the inspections performed, the extent of the inspections, the methods used, a description of the as-found condition of the lower head, any findings of relevant indications of through-wall leakage, and a summary of the disposition of any findings of boric acid deposits and any corrective actions taken as a result of indications found:***

**Response**

CR3 will provide this request within 60 days after plant restart following the next inspection.



## References

1. FPC to NRC letter, 3F0103-03, dated January 28, 2003, Crystal River Unit 3 - Response to Request for Additional Information, Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity"
2. NRC to FPC letter, 3N1102-06, dated November 22, 2002, Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity," 60-Day Response for Crystal River Unit 3 Request for Additional Information (TAC No. MB4539)
3. FPC to NRC letter, 3F0502-01, dated May 15, 2002, Crystal River Unit 3 - 60-Day Response to Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity"
4. EPRI Document MRP-48, "PWR Materials Reliability Program Response to NRC Bulletin 2001-01 (MRP-48)," EPRI, Palo Alto, CA, August 2001. 1006284
5. FPC to NRC letter, 3F0801-06, dated August 30, 2001, "Response to NRC Bulletin 2001-01, Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles"
6. Visual Examination for Leakage of PWR Reactor Head Penetrations, Revision 2 of 1006296, Includes 2002 Inspection Results and MRP Inspection Guidance. Final Report, March 2003. 1007842

**PROGRESS ENERGY FLORIDA, INC.**

**CRYSTAL RIVER UNIT 3**

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**ATTACHMENT B**

**List of Regulatory Commitments**

### List of Regulatory Commitments

The following table identifies those actions committed to by Crystal River Unit 3 (CR3) in this document. Any other actions discussed in the submittal represent intended or planned actions by Progress Energy Florida, Inc. (PEF). They are described to the NRC for the NRC's information and are not regulatory commitments. Please notify the Supervisor, Licensing and Regulatory Programs of any questions regarding this document or any associated regulatory commitments.

Commitment	Due Date
The planned examination scope for CR3 RFO 13 (October 2003) will include all 52 IMI penetrations including 100% of the circumference of each penetration as it enters the Reactor Vessel lower head. The insulation will be removed as needed to provide access to the bare metal around each IMI penetration.	Refueling Outage 13 (October 2003)
CR3 will schedule and perform the enhanced visual examinations of each IMI penetration described above to coincide with the 10 year ISI examinations of the RPV.	Refueling Outage 15 (2007)